ONA

Quick guide

Thank you for choosing ONA for your Eurorack System.

Powering up

1. Turn off the power of your modular synthesizer.

2. Double check the power cord polarity. If you plug the module backwards you might damage its electronic circuits.

If you flip over your ONA, you will find the "RED" mark at the PCB power connector, which must match the colored line on the ribbon cable.

3. Once you have checked all the connections, you can turn on your modular system.

4. If you notice any anomalies, turn your system off right away and check again your connections.

Description

ONA is a **Voltage-Controlled Analog Oscillator.**

An **Oscillator** is a device that generates alternating electric currents by non-mechanical means and its frequency depends on the components of the circuit.

It can work as an Audio Oscillator or as a Low Frequency Modulator (LFO) and it provides control over all its parameters, making it a versatile, deep and easy-to-use oscillator.

Voltage Controlled Oscillators (commonly referred to as VCOs) are used in synthesizers to convert a DC signal from the power supply into an AC signal, where the signal then oscillates at a certain frequency, generating a sound. The frequency of a VCO can be adjusted via input voltage or current modulation.

ONA is an **Analog oscillator**, which means that no computer source code specifies or emulates the transient response behavior of its analog circuits.

Core performance

The heart of the oscillator is based on a **3340 chip** which uses a discrete pure analog **Triangle Core.**

The 3340 is a high precision Voltage Controlled Oscillator, featuring both **exponential and linear control scales**. Full temperature compensation makes this VCO extremely stable.

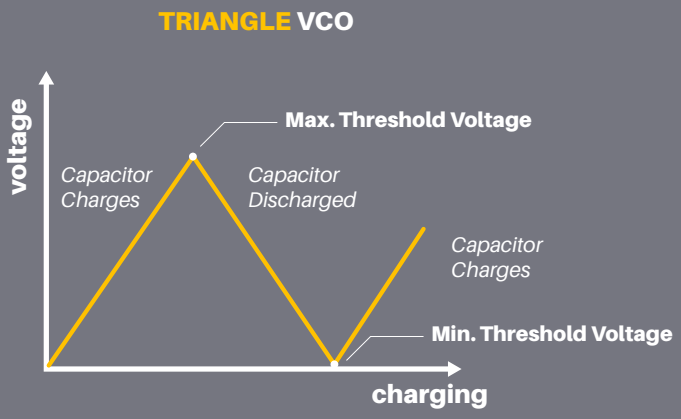


Fig.1 Voltage-Charge in a Triangle VCO

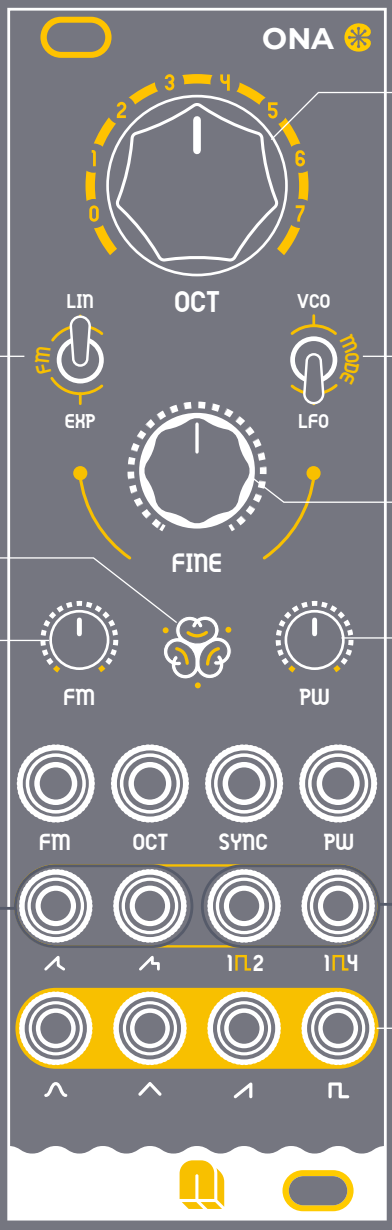
Thanks to this triangle-core oscillator and its wave-shapers you can choose between a big palette of **output waveforms** to give shape to your ideas.

- **Classic Waveforms.** Sine, Triangle, Sawtooth, Pulse.
- **2 Complex Waveforms.** Complex 1 & Complex 2.
- **2 Sub Waveforms.** Sub -1 Octave & Sub -2 Octave.

Each waveform will be explained in detail later on.

Layout

This image will clarify the function of each of the elements of the module.



Octave Adjust
Sweep through 8 octaves.

FM Mode Selector
Selects the mode of the FM input:
LINEAR / EXPONENTIAL Response

Mode Selector
VCO Audio Oscillator
LFO Low Frequency Oscillator

Fine Adjust
± 7 semitones

LED Level Indicator

FM Attenuator
Adjusts the amount of FM input.

Pulse Width Attenuator
If PW Input is not connected, it behaves as a **PWM adjust** between 1% - 100%

If PW Input is connected, it behaves as an **Attenuator.**

Inputs
FM Modulates the Oscillator's Frequency
OCT Primary pitch input (1V/OCT Tracking)
SYNC Resets oscillator phase when triggered
PW Modulates the Pulse Width

OUTPUTS
Sub Waveforms
-1 Octave Square Waveform → 1⊓2
-2 Octaves Square Waveform → 1⊓4

OUTPUTS
Complex Waveforms
Complex Wave 1 with PWM →
Complex Wave 2 with PWM →

OUTPUTS
Classic Waveforms
From left to right:
Sine, Triangle, Saw and Pulse.

Controls

- **Octave Adjust**
  The coarse tuning of the oscillator is set by this 8-position switch knob. Each position sums 1 octave to the main oscillator's frequency. (Fig. 2)

Fig.2 Detail of OCT Knob

- **Fine Adjust**
  This knob functions as a fine adjustment for the tuning frequency in both modes, LFO & VCO. The range is approximately ±7 semitones from the centre position. (Fig. 3)

Fig.3 Detail of FINE Knob

- **FM Mode Switch**
  This switch allows you to select the **FM Input** behaviour. FM Input can affect the tuning in a linear (LIN) or exponential (EXP) way. (Fig. 4)

Fig.4 Detail of FM Selector Switch

- **Mode Switch**
  This switch allows you to select between ONA's VCO and LFO Mode. (Fig. 5)

  */**VCO Mode.** It covers the needs of an Audio Oscillator, with frequencies between 20 Hz up to more than 40 kHz.*

  */**LFO Mode.** With frequencies between +1 minute in length up to low audio rates, it covers the needs of a Low Frequency Modulator.*

Fig.5 Detail of MODE Selector Switch

Controls

- **FM Attenuator**
  The FM control works as an attenuator for the external voltages introduced in the module through the FM input.

- **PW Attenuator**
  This knob sets the **Base Pulse Width** and also works as an Attenuator for the **PW Input** if there is a cable connected.

/Fully counter clockwise. *The output produces a narrow 1% duty cycle pulse.*

/3 o'clock position. *A square wave is produced (50% duty cycle).*

/Fully clockwise. *The output produces a pulse with a 100% duty cycle.*

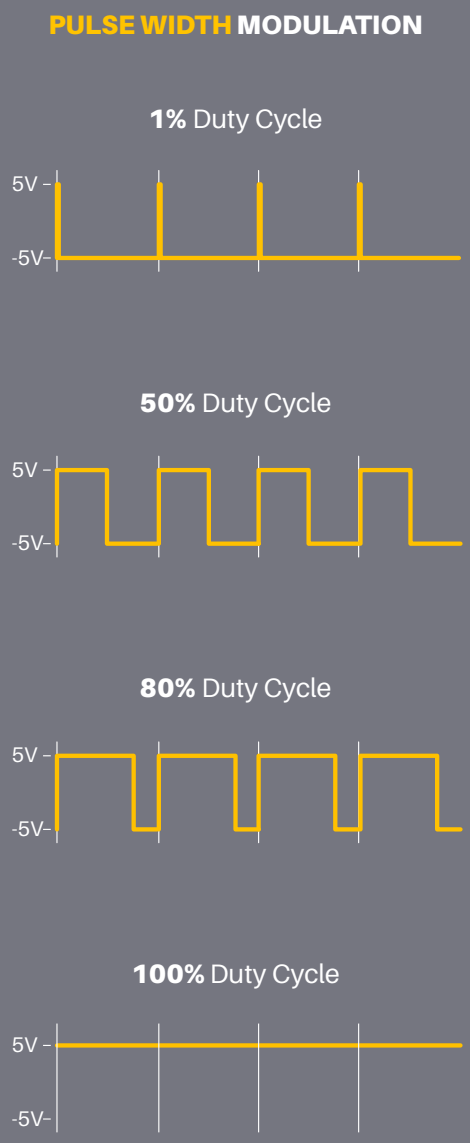


Fig.6 Pulse Width Modulation graphs.

Inputs & Outputs

- **Inputs**

/FM
When a voltage is applied to this input it varies the **oscillator's frequency.** This can be regulated with the **FM Attenuator.**

The behaviour of this input is determined by the position of the **FM Mode switch.**

/OCT
Primary Frequency voltage control.

When applying a **positive voltage** to this input, it raises the oscillator pitch at the rate of one octave for each volt applied.
When applying a **negative voltage**, it will reduce the pitch by one octave per volt.

/SYNC
An external waveform of ±5V can be applied to this input to **reset** the oscillator's waveform for interesting sound results or synchronizing purposes.

/PW
It varies the **PWM duty cycle** of the **Pulse** and **Complex outputs**.

The control voltage range should be between [0, 5]V and the intensity can be controlled between 0% to 100% with the PW knob.

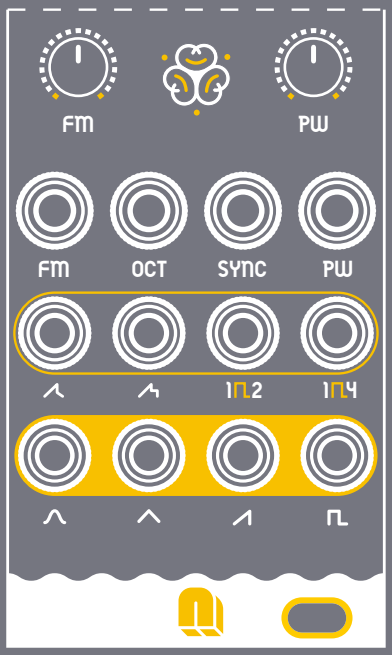


Fig.7 Inputs & Outputs Close-up View

• **Outputs**

/Basic Waveforms
Make it sound classic.

Sine. *It sounds as it looks: smooth and clean. It is sound at its most basic.*

Triangle. *It looks like an angular sine wave, and it sounds somewhere in between a square wave and a sine wave.*

Sawtooth. *It is the buzziest sounding of them all, sounding even harsher than a square wave, and that's because it's the richest in terms of harmonics.*

Pulse. *Ii is essentially a square wave with an adjustable amount of time in between each cycle before the voltage drops from maximum to minimum. The percentage of time that the signal is high is known as a duty cycle.*

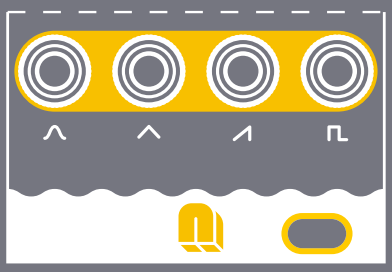


Fig.8 Detail of Basic Waveforms

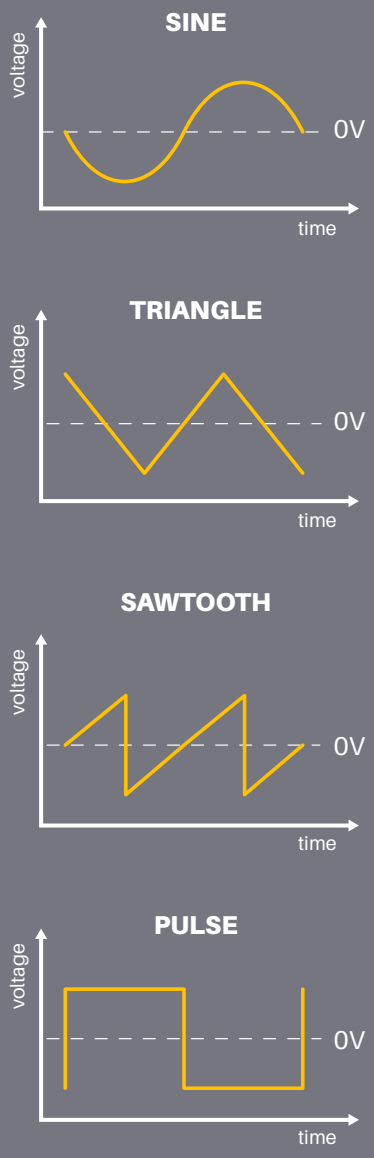


Fig.9 Basic Waveforms Representation

/Complex Waveforms
Make it sound unique.

Complex 1. → ⩚
A triangle wave mixed by a PWM pulse.

Complex 2. → ⩛
A saw wave mixed by a PWM pulse.

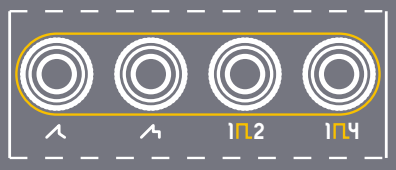
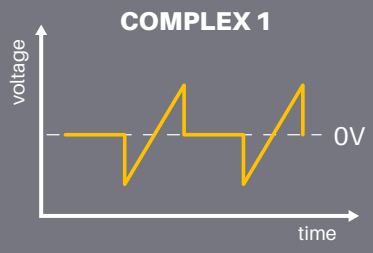


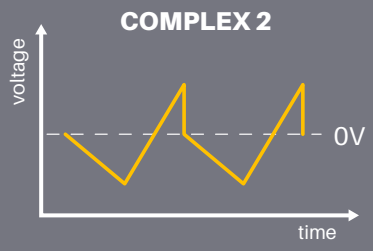
Fig.10 Detail of Complex & Sub Waveforms Outputs

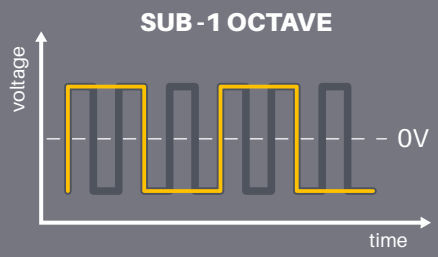
/Sub Waveforms
Make it sound fatter.

Sub -1 Octave. → 1⊓2
A square wave that goes 1 octave below the main tuning of the oscillator.

Sub -2 Octave. → 1⊓4
A square wave that goes 2 octaves below the main tuning of the oscillator.







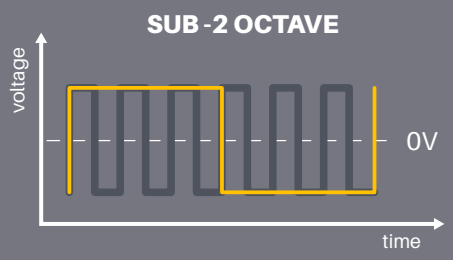


Fig.11 Complex & Sub Waveforms Representation

Calibration

ONA is factory calibrated with precision sources. The following procedure is for adjusting inaccuracies or tuning problems in your system:

1. Turn on your modular with ONA connected and let it heat for 5 to 10 minutes.

2. Put the Octave Knob in 0 position, and Fine Knob at 12 o'clock.

3. Send voltages corresponding to 1V steps, go some octaves up and check if it maintains the expected frequency intervals.

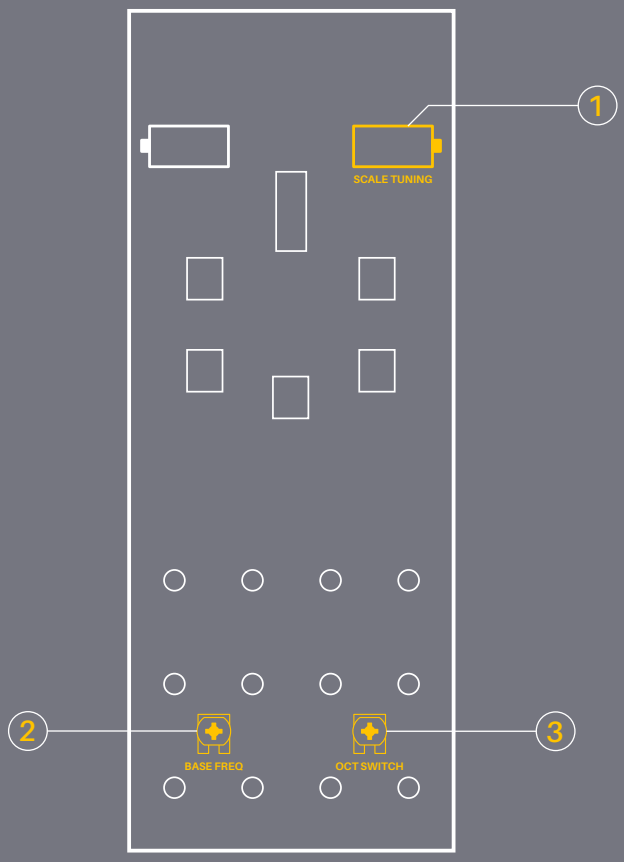
4. If ONA does not follow the 1V/Octave rule, adjust the Scale Multiturn Trimmer [1].

5. Repeat steps 3 and 4 until ONA follows perfectly the 1V/Octave rule.

6. Moving the Scale Multiturn Trimmer will cause to change the base frequency, so you'll have to adjust the Base Frequency Trimmer [2] in order to adjust a perfect C note into the Fine Knob at 12 o'clock.

7. Disconnect the CV source and move the Octave Knob to the highest octave (7), if it doesn't track well, adjust the Octave Switch Trimmer [3] in order to have a perfect C in every position of the switch.

Now ONA is tuned!



Compliance

This device complies to the **EU guidelines** and is manufactured **RoHS** conforming without use of led, mercury, cadmium and chrome. Nevertheless, this device is special waste and disposal in household waste is not recommended.

This device meets the requirements of the following standards and directives:

- **EMC: 2014/30/EU**
- **EN 55032.** Electromagnetic compatibility of multimedia equipment.
- **EN 55103-2.** Electromagnetic compatibility - Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use.
- **EN 61000-3-2.** Limits for harmonic current emissions.
- **EN 61000-3-3.** Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
- **EN 62311.** Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields.
- **RoHS2: 2011/65/EU**
- **WEEE: 2012/19/EU**

Guarantee

This product is covered by **2 years of guarantee** on purchased goods, which begins when you receive your package.

- **This guarantee covers**

  Any defect in the manufacturing of this product.
  Replacement or repair, as decided by NANO Modules.

- **This guarantee does not cover**

  Any damage or malfunction caused by incorrect use , such as, but not limited to:
  - Power cables connected backwards.
  - Excessive voltage levels.
  - Unauthorized mods.
  - Exposure to extreme temperature or moisture levels.

Please contact our customer service - jorge@nanomodul.es - for a return authorization before sending the module. The cost of sending a module back for servicing is paid for by the customer.

Technical Specifications

Dimensions 8HP 40x128,5mm
Current 50 mA +12V / 30 mA -12V / 0 mA +5V
Output Signals ±5V
Impedance Input 10k - Output 10k
Materials PCB and Panel - FR4 1,6mm
Depth 20mm - Skiff friendly

Modules are designed and assembled in València.

Contact

Bravo!
You have learned the basic fundamentals of your ONA Module.

If you have any doubts, please feel free to contact us.
nanomodul.es/contact

ONA